

We claim:

- 1 1. A method of controlling a space switch to establish time-varying connections, said
2 method comprising:

3 receiving a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;

6 generating scheduling information for each of said burst transfer requests based on
7 said parameters;

8 transmitting said scheduling information to said source node; and

9 transmitting instructions to a slave controller for said space switch, where said
10 instructions are based on said scheduling information and instruct said space switch to
11 establish said requested connection.

- 12 2. The method of claim 1 wherein said scheduling information includes an indication of a
time at which said space switch will be scheduled to establish said requested connection.

- 13 3. A space switch master controller comprising:

14 a source interface for:

15 receiving a stream of burst transfer requests from a source node, each of said
16 burst transfer request including parameters specifying a requested connection
17 and a duration for said requested connection;

18 transmitting scheduling information for each of said burst transfer requests to
19 said source node;

20 a burst scheduler for generating said scheduling information for each of said burst
21 transfer requests in said stream based on said parameters; and

22 a slave controller interface for transmitting instructions to a slave controller for said
space switch, where said instructions are based on said scheduling information and
instruct said space switch to establish said requested connection.

1 4. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a space switch master controller, cause the processor to:

3 receive a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;

6 generate scheduling information for each of said burst transfer requests based on said
7 parameters;

8 transmit said scheduling information to said source node; and

9 transmit instructions to a slave controller for said space switch, where said
10 instructions are based on said scheduling information and instruct said space switch to
11 establish said requested connection.

12 5. A method of generating scheduling information comprising:

13 determining a next-available input port among a plurality of input ports and a time
1 index at which said next-available input port will become available;

2 for each burst transfer request of a plurality of burst transfer requests received in
3 relation to said next-available input port, and where each said each burst transfer
4 request includes an identity of a burst and a destination for said burst:

5 determining, from said destination for said burst, a corresponding output port
6 among a plurality of output ports;

7 determining a time gap, where said time gap is a difference between:

8 said time index at which said next-available input port will become
9 available; and

10 a time index at which said corresponding output port will become
11 available;

14 selecting one of said plurality of burst transfer requests as a selected burst transfer
15 request, where said selected burst transfer request has a minimum time gap of said
16 plurality of burst transfer requests;

17 selecting a scheduled time index, where said scheduled time index is one of said time
18 index at which said next-available input port is available and said time index at which
19 said corresponding output port is available; and

20 transmitting scheduling information for a burst identified by said selected burst
21 transfer request, said scheduling information based on said scheduled time index.

1 6. The method of claim 5 wherein said determining said next-available input port comprises
2 scanning a time calendar until an input port identifier is detected in a time slot, said calendar
3 having a plurality of time slots, where each time slot corresponds to a predefined time
4 interval.

1 7. The method of claim 6 wherein said determining said time gap comprises reading said
2 time index at which said corresponding output port is available from an element in an array,
3 where said element is associated with said corresponding output port.

1 8. The method of claim 7 further comprising:

2 determining, from said selected burst transfer request, a transfer-time for said burst;

3 adding said transfer-time to said scheduled time index to result in a finishing time
4 index; and

5 writing said input port identifier in a time slot corresponding to said finishing time
6 index.

1 9. The method of claim 8 further comprising writing a null identifier in a time slot
2 corresponding to said scheduled time index.

1 10. The method of claim 9 further comprising writing said finishing time index to said
2 element in said array.

1 11. The method of claim 10 wherein said array is one of a plurality of arrays and said writing
2 said finishing time index comprises writing said finishing time index to the element that is
3 associated with said corresponding output port in each of said plurality of arrays.

1 12. The method of claim 11 wherein said writing in each of said plurality of arrays is
2 performed in parallel.

1 13. The method of claim 10 wherein said time index at which said corresponding output port
2 is available is selected as said scheduled time index.

1 14. The method of claim 10 wherein a calendar time slot index at which said input port
2 identifier is detected is selected as said scheduled time index.

1 15. The method of claim 6 wherein said input port identifier is detected only if included in a
2 predetermined group of input port identifiers.

1 16. The method of claim 15 wherein burst transfer requests are organized by groups of output
2 ports and said determining said time gap is limited to include only those burst transfer
3 requests corresponding to a group of said plurality of output ports.

1 17. A burst scheduler comprising a processor operable to:

2 determine a next-available input port among a plurality of input ports and a time index
3 at which said next-available input port will become available;

4 for each burst transfer request of a plurality of burst transfer requests received in
5 relation to said next-available input port, and where each said each burst transfer
6 request includes an identity of a burst and a destination for said burst:

7 determine, from said destination for said burst, a corresponding output port
8 among a plurality of output ports;

9 determine a time gap, where said time gap is a difference between:
10 said time index at which said next-available input port will become
11 available; and

12 a time index at which said corresponding output port will become
13 available;

14 select one of said plurality of burst transfer requests as a selected burst transfer
15 request, where said selected burst transfer request has a minimum time gap of said
16 plurality of burst transfer requests;

17 select a scheduled time index, where said scheduled time index is one of said time
18 index at which said next-available input port is available and said time index at which
19 said corresponding output port is available; and

20 generate scheduling information for a burst identified by said selected burst transfer
21 request, said scheduling information based on said scheduled time index.

1 18. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a burst scheduler, cause the processor to:

3 determine a next-available input port among a plurality of input ports and a time index
4 at which said next-available input port will become available;

5 for each burst transfer request of a plurality of burst transfer requests received in
6 relation to said next-available input port, and where each said each burst transfer
7 request includes an identity of a burst and a destination for said burst:

8 determine, from said destination for said burst, a corresponding output port
9 among a plurality of output ports;

10 determine a time gap, where said time gap is a difference between:

11 said time index at which said next-available input port will become
12 available; and

13 a time index at which said corresponding output port will become
14 available;

15 select one of said plurality of burst transfer requests as a selected burst transfer
16 request, where said selected burst transfer request has a minimum time gap of said
17 plurality of burst transfer requests;

18 select a scheduled time index, where said scheduled time index is one of said time
19 index at which said next-available input port is available and said time index at which
20 said corresponding output port is available; and

21 generate scheduling information for a burst identified by said selected burst transfer
22 request, said scheduling information based on said scheduled time index.

1 19. A core node in a data network comprising:

2 a space switch;
3 a plurality of input ports;
4 a plurality of output ports; and
5 a slave controller for said space switch for receiving instructions from a master
6 controller of said space switch, said instructions including specifications of temporary
7 connections to establish between said plurality of input ports and said plurality of
8 output ports and indications of timing with which to establish said connections.

1 20. The core node of claim 19 further comprising a master controller for said space switch,
2 for:

3 receiving a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;

6 generating scheduling information for each said burst transfer request based on said
7 parameters;

8 transmitting said scheduling information to said source node; and

9 transmitting said instructions to said slave controller for said space switch, where said
10 instructions are based on said scheduling information.

- 1 21. A data network comprising:
 - 2 a plurality of edge nodes;
 - 3 a plurality of core nodes, each core node of said plurality of core nodes including a space switch; and
 - 5 a master controller for one said space switch in one said core node for:
 - 6 receiving a stream of burst transfer requests from one of said plurality of edge nodes, each of said burst transfer requests including parameters specifying a requested connection and a duration for said requested connection;
 - 9 generating scheduling information for each of said burst transfer requests based on said parameters;
 - 10 transmitting said scheduling information to said one of said plurality of edge nodes; and
 - 13 transmitting said instructions to a slave controller for said one said space switch, where said instructions are based on said scheduling information.